Transformers

Learning Goals:
Describe how electromagnetic induction applies to a transformer
Calculate voltages, currents and powers using the transformer equation
Explain how transformers are used in the national grid.

Starter:

Use the space to work together to draw/write what you remember about transformers

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What is the shape of the magnetic field around a solenoid?

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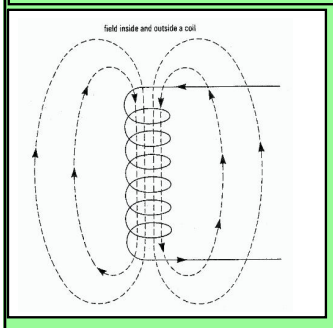

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What would happen to the field if we used an A.C. current?

What would happen if we were to place a different solenoid inside this one?

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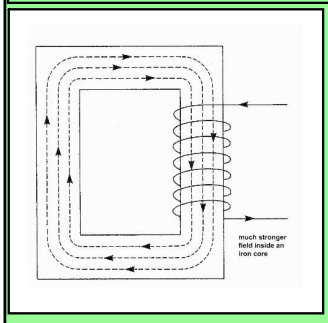

An Iron core means the field is "strengthened"

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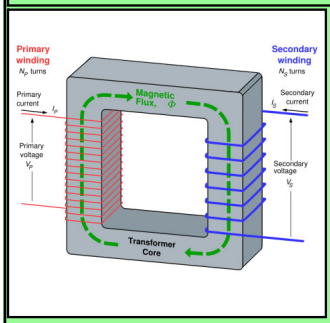

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$$\frac{V_p}{V_s} = \frac{N_p}{N_s}$$

$$V_p I_p = V_s I_s$$

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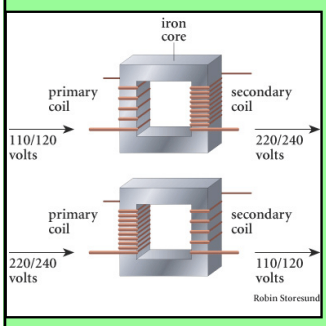
- *Ratio of turns on primary and secondary is equal to ratio of voltage across primary and secondary*
- *Power is conserved across a transformer ($V_pI_p = V_sI_s$)*
- *Transformers are in reality not 100% efficient*



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$$\frac{V_s}{V_p} = \frac{N_s}{N_p} \qquad P = IV$$

Try some questions!

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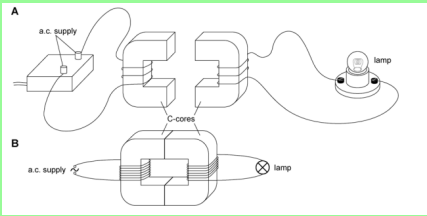
Class practical



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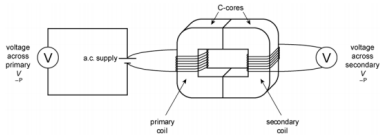
Class practical

To do



1. Make up a table to record the voltage supplied to the primary coil, V_p, the number of turns in the primary coil, N_p, the number of turns in the secondary coil, N_s, and the voltage across the secondary coil, V_s .
2. Start with a low voltage supplied to the primary coil and the same number of turns in both coils.
3. Switch on, record the values for voltage, and switch off.
4. Double the number of turns in the secondary coil. (This is a step-up transformer.)
5. Repeat step **3**.
6. Keep changing the number of turns – try three times and four times the number of turns in the secondary coil.
7. Try making the primary coil have more turns than the secondary coil. (This is a step-down transformer.)

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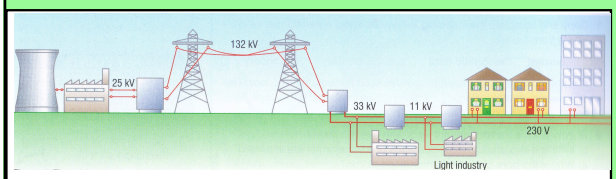

Why use high voltages in pylons?